Catalogue of American Amphibians and Reptiles.

Leonard, W.P. and K. Ovaska. 1998. *Contia, C. tenuis*.

Contia Girard

Calamaria H. Boie *in* F. Boie 1827:519. Type species, *Calamaria lumbricoidea* Boie by subsequent designation.

Homalosoma Wagler 1830:190. Considered a substitute name for *Duberria* Fitzinger. Williams and Wallace (1989) raised the possibility that *Homalosoma* had been proposed as a new genus, in which case *Coluber arctiventris* is the type species.

Contia Girard *in* Baird and Girard 1853:110. Type species, *Contia mitis* (= *Calamaria tenuis* Baird and Girard) by original designation and monotypy.

Lodia Girard *in* Baird and Girard 1853:116 (= *Contia*). Type species, *Calamaria tenuis* by original designation and monotypy.

Ablabes Duméril, Bibron, and Duméril 1854:304 (= *Lycodonomorphus*). Type species, *Lycodonomorphus rufulus* Fitzinger (= *Coronella rufula* Lichtenstein) by subsequent designation.

• **CONTENT.** Only one monotypic species, *Contia tenuis*, is recognized.

• **DEFINITION and DIAGNOSIS.** *Contia* is a small, slender snake, TL of adults about 20–40 cm. The small head is dorsally flattened and the snout is rounded. The eyes have a round pupil. A slight constriction at the neck separates the head from the body.

Dorsal scales are smooth, without pits (see Comments), and in 15 rows. The anal plate (= cloacal scute) is divided. Caudals occur as a series of two. The tail is short and tapered, with a sharply pointed scale at the tip. Scalation of the head features 7 each of upper and lower labials, 2 temporals, 1 pre- and 2 postoculars, 2 nasals that are either entire, divided, or partially divided, 1 loreal, and paired anterior chin shields that are much larger than those located posteriorly. Teeth are relatively long in comparison with those of other small colubrids (Zweifel 1954; Stebbins 1959, 1972).

The dorsum of adults is reddish brown or gray (Stebbins 1954, 1966, 1985). A dark mask usually is present. Paler, yellowish, or reddish lateral stripes, bordered below by a row of black dots, may be present (Schmidt and Davis 1941, Stebbins 1954). The anterior edge of each ventral is black, whereas the posterior portion is pale-colored, resulting in a characteristic banded appearance of the venter. The dorsum of juveniles often is red and brighter in color than that of adults. The sides are almost always dark.

The diploid number of chromosomes is 36 (16 macro- and 20 microchromosomes), the number of chromosome arms in the karyotype being 50 (Bury et al. 1970).

At this time, differences in the scalation pattern, together with characteristics of scales, teeth, and jaws, appear to be sufficient to separate *Contia* from other genera of colubrids (but see Remarks). Osteological features that differentiate *Contia* from *Eirenis* (see Remarks) include a palatine without a maxillary process, an unforked and relatively long ectopterygoid, a relatively long anterior portion of the pterygoid, and 11 maxillary teeth (18 in *Eirenis*); the condition of the remaining characters is opposite in *Eirenis* (Stickel 1951).

• **DESCRIPTIONS, ILLUSTRATIONS, DISTRIBUTION, FOSSIL RECORD, and PERTINENT LITERATURE.** See species account.

FIGURE 1. Adult *Contia tenuis* from Kittitas County, Washington (top); hatchling from Skamania County, Washington (middle); venter of same hatchling (bottom).

• **REMARKS.** Boulenger (1893) included a number of small, superficially similar snakes from southwestern Asia, India, and the Americas in the genus *Contia*. Among the genera since separated from *Contia* are *Opheodrys*, *Sonora*, *Chionactis*, *Conopsis*, *Pseudoficimia*, and *Eirenis* (Stickel 1951). Stickel (1951) compared the teeth, jaws, and hemipenes of *C. tenuis* and *E. modesta* and concluded that similarities between the two are no greater than expected for members of the same family. The relationship of *Contia* to other colubrid genera remains obscure (Cadle 1984, 1988).

• **ETYMOLOGY.** The genus was named in honor of the 19th century zoologist John Lawrence LeConte (1825–1883), son of the naturalist John Eatton LeConte. John L. LeConte collected many specimens of reptiles and amphibians for the United States National Museum, including a specimen of *Contia* from San Jose, California (Baird and Girard 1853).

Contia tenuis (Baird and Girard)
Sharp-tailed Snake

Calamaria tenuis Baird and Girard 1852:176. Type locality, "Puget Sound" (restricted to Pierce Co., Washington; see Comments). Holotype, National Museum of Natural History (USNM) 7289, a small adult (173 mm SVL, 203 mm TL; D. Darda, pers. comm.), collected in 1841 by the U.S. Exploring Expedition (not examined by authors); paratype, USNM 8075, a male (175 mm SVL, 208 mm TL; D. Darda, pers. comm.), collected in "Oregon" by A.J. Skilton (not examined by authors).

Contia mitis Baird and Girard 1853:110. Type locality, "San Jose, [Santa Clara County] California." Holotype, National Museum of Natural History (USNM) 2034, an adult (265 mm SVL, 305 mm TL; D. Darda, pers. comm.), collected by J.L. LeConte (not examined by authors).

Lodia tenuis: Baird and Girard 1853:116. First use of combination.

Ablabes purpureocauda Günther 1858:245. Type locality, "California." Syntypes, British Museum of Natural History (BMNH) 1946.1.5.34–35 (formerly 1858.6.21.9–10), collected by Mr. Bridges, date unknown (not examined by authors).

Homalosoma mite: Jan 1862:33. First use of this combination.

Contia tenuis: Stejneger and Barbour 1917:91. First use of this combination.

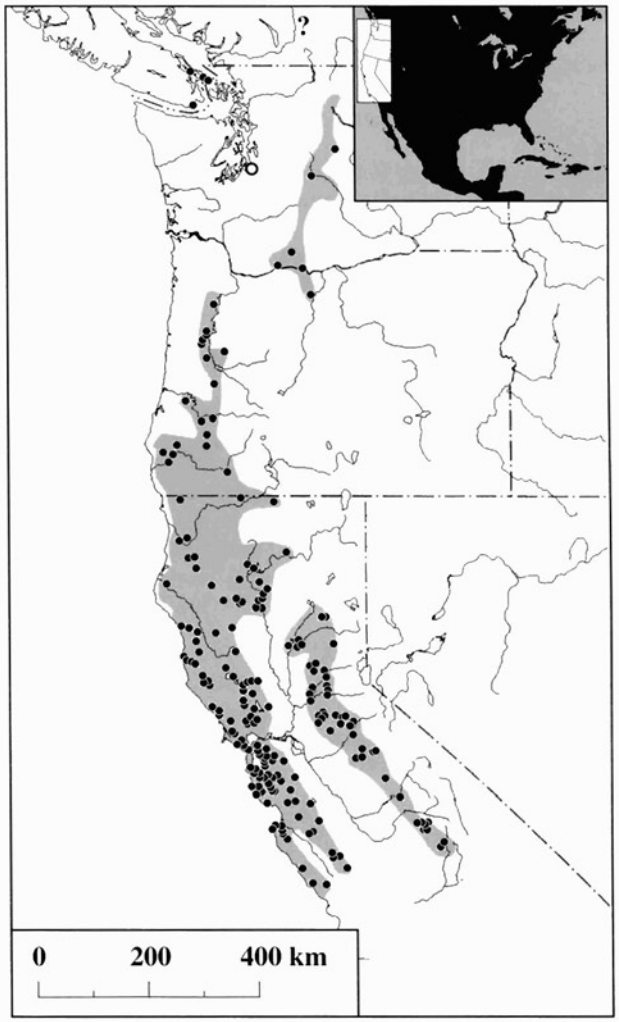
• **CONTENT.** This species is the sole member of the genus *Contia*. No subspecies are recognized (Banks et al. 1987, Collins 1997).

• **DEFINITION.** See the generic account.

• **DESCRIPTIONS.** Early descriptions are in Baird and Girard (1852, 1853), Girard (1858), Günther (1858), Boulenger (1893), Van Denburgh (1897), and Cope (1898 [1900]). Detailed descriptions of scalation, coloration, and other features are in Van Denburgh (1922) and Wright and Wright (1957). Distinguishing features are described in Ditmars (1907, 1936, 1944), Blanchard (1925), Slevin (1934), Gordon (1939), Schmidt and Davis (1941), Pickwell (1947), Storm (1948), Stebbins (1954, 1959, 1966, 1972, 1985), Blair et al. (1957, 1968), Cook (1960), Carl (1968), Shaw and Campbell (1974), Cochran and Goin (1970), Froom (1972), Leviton (1972), Behler and King (1979), Simon (1979), Smith and Brodie (1982), Nussbaum et al. (1983), Cook (1984), Gregory and Campbell (1984), Spalding (1993, 1995), Blaustein et al. (1995), Darda (1995), and Johnson (1995). Eggs were described by Stebbins (1954), Cook (1960), and Brodie et al. (1969).

The cream-colored or pale-yellow eggs are elongate, and the embryo is visible through the eggshell (Cook 1960, Brodie et al. 1969). One unhatched, apparently full-term egg found in the field measured 7 x 28 mm and weighed 0.84 g (Brodie et al. 1969). Non-viable eggs laid by two females in captivity measured 19.7–21.5 x 6.4–7.8 mm (field notes by R.C. Stebbins cited in Cook 1960) and 15.5–23.4 x 6.9 mm (Leonard et al. 1996, ignoring one apparently deformed egg). Six juveniles collected near hatched eggs in the field were 75–92 mm SVL and 89–104 mm TL (Brodie et al. 1969).

• **ILLUSTRATIONS.** Color photographs of live specimens are in Cochran and Goin (1970), Leviton (1972), Shaw and Campbell (1974), Basey (1976), Kozloff (1976), Behler and King (1979), Darda (1995, dorsum and venter), Goldberg (1997), Brown (1997), and West and Leonard (1997). Black-and-white photographs of live or apparently live specimens are in Gordon (1939), Ditmars (1944, dorsum and head), Pickwell (1947, dorsum and venter), Storm (1948, 1974), Froom (1972), and



MAP. Distribution of *Contia tenuis*. A circle identifies the type locality, mapped at Gravelly Lake, Pierce County, Washington (see Comments); dots mark other localities; the question mark indicates a record of uncertain validity. Range outlines are not provided for isolated records from the Puget Sound region and British Columbia. All but one location from British Columbia, one from Washington, seven from Oregon, and two from California, which were taken from the literature, are based on catalogued museum records.

Museum records plotted on the map are from UAZ, MNH, ANH, BYU, Royal British Columbia Museum, CAS, MVZ, California State University (Sacramento), University of California (Santa Barbara), CM, UCM, FMNH, UF, USDA Forest Service (Pacific Southwest Research Station, Arcata), Humboldt State University, UIMNH, LACM, Louisiana State University, MCZ, UMMZ, University of North Carolina, Oregon State University, Southern Oregon University, SDNHM, University of Texas at Arlington Collection of Vertebrates, Washington State University (includes Walla Walla College), University of Puget Sound Museum, the collection of Robert Hansen (records obtained by the authors); Stanford University (records taken from Cook 1960); University of New Mexico (records obtained via Ted Brown), and The Natural History Museum (record obtained via the British Columbia Conservation Data Centre, Victoria). Museum acronyms follow Edwards (1975).

This account should be considered a secondary source of information, as the authors did not examine museum specimens to validate identification. In addition to museum records, sight records and habitat data were used to define a predicted range. No effort was made to identify areas of unsuitable habitat within the predicted range boundaries. Some populations may have been extirpated in portions of the areas indicated by the species' historic distribution; numerous museum records document specimens that were collected over 50 years ago.

Spalding (1995, dorsum and venter). Black-and-white photographs of apparently preserved specimens are in Wright and Wright (1957; venter, dorsum, head, tail, and midsections) and Nussbaum et al. (1983, venter). The karyotype is shown in Bury et al. (1970).

Color paintings are in Girard (1858), Stebbins (1959, 1966, 1972, 1985; same painting), Brown (1974), Simon (1979), and Smith and Brodie (1982). Black and white drawings are in Girard (1858; head, dorsal scales, and vent), Jan and Sordelli (1860–1868; body, head, and scales), Van Denburgh (1897; head, dorsal scale rows, and ventrals), Cope (1900; head, lateral view of dorsal scale rows, and ventrals), Blanchard (1925; lateral view of head), Schmidt and Davis (1941, head and neck), Stebbins (1954, dorsum and head), Wright and Wright (1957, head), Carl (1968, dorsum), Savage (1962, head and ventrals), Basey and Sinclear (1980, head and upper body), St. John (1980, dorsum), Cook (1984, anterior portion of body including head), Gregory and Campbell (1984, dorsum), and Brown (1997, head).

A line drawing of the jaw and elongated teeth is in Zweifel (1954) and one of the skull, including jaws and teeth, is in Stebbins (1959, 1972; same illustration); both authors also show the teeth of *Diadophis punctatus* for comparison.

• **DISTRIBUTION.** *Contia tenuis* has a patchy distribution ranging from southern British Columbia, Canada, to central California, United States. In British Columbia, *C. tenuis* occurs along the southwest coast on southeastern Vancouver Island and the Gulf Islands; an isolated record exists from the south-central mainland (but see Remarks). In Washington, the species is known from the Puget Lowland southwest of Tacoma and along the East Cascade Slope. In Oregon, it occurs in the Coast Ranges, Willamette Valley, Klamath Mountains, and the northern East Cascade Slope. In California, it is known from the Klamath Mountains, Coast Ranges to as far south as northern San Luis Obispo County, East Cascade Slope, and the west slope of the Sierra Nevada south to Tulare County. The lava flows country in the vicinity of Mt. Lassen apparently creates a barrier between populations in the Sierra Nevada and those in the east Cascade Slope and Klamath Mountains (S. Sweet, pers. comm.).

Distribution maps that depict the entire range of the species are in Wright and Wright (1957), Stebbins (1954, 1966, 1985), Cook (1960), Savage (1962), Shaw and Campbell (1974), Behler and King (1979), Smith and Brodie (1982), and Spalding (1993). Maps or written descriptions of regional distributions are in Van Denburgh (1897, 1922; Washington, Oregon, and California), Nussbaum et al. (1983; British Columbia, Washington, and Oregon), Cook (1984; British Columbia, Washington, and northern Oregon), and Blaustein et al. (1995; British Columbia, northern California, Oregon, and Washington). Citations that provide locality records or descriptions of distribution within individual states or British Columbia are as follows: British Columbia (Carl 1949, 1950 1968, 1971; Tanner 1967; Gregory and Campbell 1984; Spalding 1995; Ovaska and Engelstoft 1998); California (Cope 1898 [1900]; Grinnell and Camp 1917; Walker 1946; Hawken 1951; Pimentel 1958; Richards 1958; Harris 1959; Cunningham 1962; Livezey 1962; Banta and Morafka 1966, 1968; Morafka and Banta 1972; Stebbins 1972; Basey 1976; Basey and Sinclear 1980; Hayes and Cliff 1982; Hansen and Thomason 1991; Brown 1997); Oregon (Fitch 1936; Gordon 1939; Storm 1948, 1966; St. John 1980, 1982, 1984, 1985, 1987; Forbes et al. 1983; Applegarth 1994a; Csuti et al. 1997); Washington (Slater 1939, 1963b; Flynt 1962; Majors 1975; Herrington and Larsen 1983; Darda 1995; Johnson 1995; McAllister 1995; Dvornich et al. 1997; Leonard and Leonard 1998).

In British Columbia, all coastal populations occur near sea level (Spalding 1995), whereas the sole population in the interior mainland occurs at an elevation of 1400 m (Tanner 1967). In Washington and Oregon, the species is known from elevations up to 610 m (Darda 1995). In the Sierra Nevada of California, *C. tenuis* has been reported to range up to elevations of 2000 m (Richards 1958, Cunningham 1962, Stebbins 1972). For habitat associations, see Pertinent Literature.

• **FOSSIL RECORD.** No fossils are known.

• **PERTINENT LITERATURE.** References and relevant discussions are arranged by topic.

General Accounts.—Cook (1960) provided a summary of habitats, life history, seasonal occurrence, and food habits of *C. tenuis*, based mainly on specimens from California and Oregon. Summaries of the general life history and habitats are in Wright and Wright (1957), Stebbins (1954, 1959, 1966, 1972, 1985), Leviton (1972), Shaw and Campbell (1974), Behler and King (1979), Nussbaum et al. (1983), Applegarth (1994a, b), Blaustein et al. (1995), Darda (1995), and Mattison (1995). Summaries with emphasis on British Columbia are in Froom (1972), Gregory and Campbell (1984), Spalding (1993, 1995), and Ovaska and Engelstoft (1998). Rossi and Rossi (1995) summarized the life history and provided recommendations for maintaining the species in captivity.

Habitat Associations.—*Contia tenuis* occupies a wide variety of habitats, including both coniferous and deciduous forests, forest edges, oak savanna, broken chaparral, shrub-steppe, meadows, and disturbed habitats in residential areas (Walker 1946; Storm 1948; Pimentel 1958; Harris 1959; Cook 1960; Brodie et al. 1969; Stebbins 1972, 1985; Nussbaum et al. 1983; St. John 1984, 1985, 1987; Darda 1995; Spalding 1993, 1995; Blaustein et al. 1995; Leonard et al. 1996; Dvornich et al. 1997; Leonard and Leonard 1998). Substrates with rocks or decomposing wood appear to be preferred (Grinnell and Camp 1917; Grinnell et al. 1930; Storm 1948; Stebbins 1954, 1985; Wright

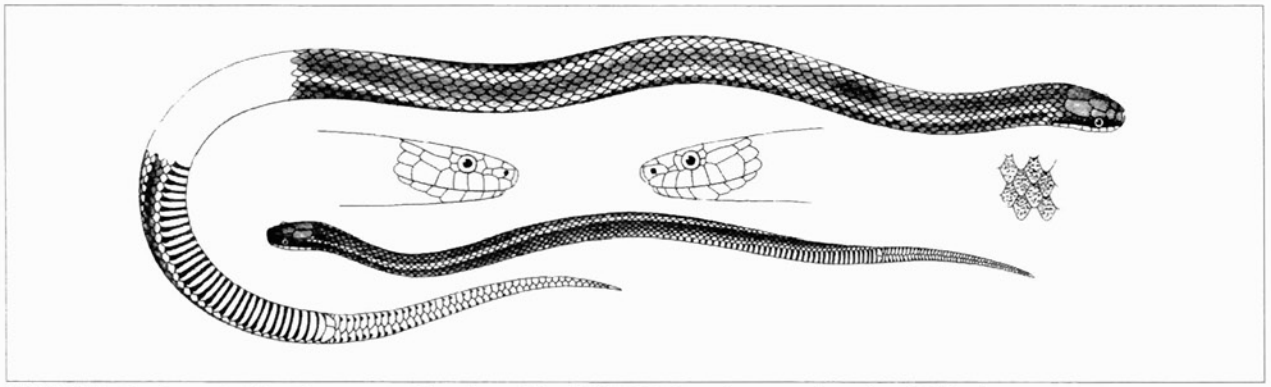


FIGURE 2. *Contia tenuis* (*Homalosoma mite*) from Jan and Sordelli (1865), based on a specimen from California.

and Wright 1957; Cook 1960; Leonard et al. 1996). Associations with hilly and mountainous terrain (Grinnell et al. 1930; Storm 1948; Shaw and Campbell 1974; St. John 1984, 1985, 1987; Applegarth 1994a) and creeks and streams (Grinnell et al. 1930, Fitch 1936, Stebbins 1954, Pimentel 1958, Harris 1959, Cook 1960, Basey and Sinclear 1980, Nussbaum et al. 1983, Leonard et al. 1996) have been reported. In the northern portion of the range, south-facing, rocky slopes may be required for egg laying (Brodie et al. 1969, Engelstoft and Ovaska 1998, Leonard and Leonard 1998). Blaustein et al. (1995) provided a summary of habitat use by *C. tenuis* in relation to forest age. Welsh and Lind (1991) and Raphael (1988) reported on captures of amphibians and reptiles, including *C. tenuis*, in forest stands of different ages in California.

Life History.—In comparison with other snakes from western North America, the life history of *C. tenuis* is poorly known (Schmidt and Davis 1941, Cook 1960, Gregory and Campbell 1984, Spalding 1995), probably reflecting difficulties associated with studying these small, secretive snakes. Very little information exists on even basic life history characteristics, such as clutch size, growth rates, age at first reproduction, and frequency of reproduction.

Brodie et al. (1969) described an egg-laying aggregation of five species of reptiles, including *C. tenuis*, from a talus slope in northwestern Oregon; 43 eggs of *C. tenuis* were found. Leonard et al. (1996) reported on aggregations, habitats, and body size of *C. tenuis* from the eastern slope of the Cascade Range in Washington. Engelstoft and Ovaska (1998) investigated movements and seasonal activity in British Columbia. Brattstrom (1965) reported on body temperatures of four field-caught *C. tenuis* from Oregon. Congdon et al. (1982) provided caloric values of bodies and eggs of various reptiles, including *C. tenuis*. Fitch (1938) and Ovaska and Engelstoft (1998) reported that individuals maintained in captivity were active at the surface almost entirely after dark, suggesting nocturnal activity. Detailed summaries of the life history are in Stebbins (1954), Wright and Wright (1957), and Cook (1960); see citations at the beginning of Pertinent Literature for additional summaries.

Food and Feeding.—Darling (1947) examined the diet of the species in Oregon. Zweifel (1954) interpreted the elongated, recurved teeth as an adaptation for feeding on gastropods.

Predation and Anti-predator Responses.—Predators of *C. tenuis* are noted in Shaw and Campbell (1974, *Diadophis punctatus* as suggested predator), Hansen and Thomason (1991; brook trout, *Salvelinus fontinalis*, and *Bufo boreas*), and Ovaska and Engelstoft (1998, birds suggested as predators based on body scars on snakes). Ovaska and Engelstoft (1999) reported on an anti-predatory behavior of juvenile *C. tenuis*. The function of the sharply pointed scale on the tail tip is unknown (Cook 1960), but it has been suggested to play a role in defense from predators (Nussbaum et al. 1983), locomotion (Carl 1949, 1968; Flynt 1962; Darda 1995), and assisting in capturing prey (Storm 1948, Stebbins 1972, Basey 1976).

Morphology and Phylogenetic Relationships.—Stickel (1951) compared jaws and teeth and the structure of the hemipenes of *Contia tenuis* with those of *Eirenis modesta*. Bury et al. (1970) examined the karyotype of 12 species of colubrids, including that of *Contia*. Using immunological data, Cadle (1984, 1988) examined molecular systematics of large numbers of colubrid species, including *C. tenuis*.

Identification Keys.—Keys in which *Contia tenuis* is included are in Blanchard (1925), Pope (1937), Gordon (1939, Oregon species only), Pickwell (1947), Wright and Wright (1957), Stebbins (1954, 1966, 1985), Savage (1962), Slater (1963a, Washington species only), Brown (1974), St. John (1980, Oregon species only), Smith and Brodie (1982), Ballinger and Lynch (1983), Gregory and Campbell (1984, British Columbia species only), and Powell et al. (1998).

• **REMARKS.** Nussbaum et al. (1983) questioned the validity of Tanner's (1967) distribution record for the species from McGillivray Lake near Chase in southern interior of British Columbia due to apparent cataloguing errors of several specimens collected on the trip during which the *C. tenuis* were obtained (E. Brodie, Jr., pers. comm). J. Heinrich (pers. comm.), the actual collector of the specimens, reported he is certain that he obtained the specimens of *C. tenuis* at McGillivray Lake. No subsequent records of *C. tenuis* are known from this locality.

• **ETYMOLOGY.** See the generic account for the etymology of *Contia*. "Tenuis" (Classical Latin) means thin, narrow, slender (Jaeger 1962), a name presumably given to the species in reference to the body form of these snakes.

• **COMMENTS.** Baird and Girard (1852, 1853) and Girard (1858) reported that the holotype had been collected by the U.S. Exploring Expedition at "Puget Sound." Between 11 May and 17 July 1841, a contingent of the Expedition was stationed at the mouth of Sequalichew Creek near the 1933 Fort Nisqually (Wilkes 1841 [1925], 1845; Hasket 1974), northwest of what is known today as Old Fort Lake, Pierce County, Washington. In the years since the U.S. Exploring Expedition, *C. tenuis* has been recorded at only two sites in the Puget Sound region, Gravelly Lake and Chambers Creek (Slater 1939, Darda 1995, Leonard and Leonard 1998), approximately 10–14 km northeast of the U.S. Exploring Expedition's encampment. Given the highly restricted distribution of *C. tenuis* in the Puget Sound region and the close proximity of the U.S. Exploring Expedition's encampment, the holotype was most likely collected in the vicinity of Gravelly Lake/Chambers Creek, Pierce County, Washington.

Stickel (1951) stated that phylogenetically *C. tenuis* "stands very much alone;" and evolutionary relationships of the species to other colubrids remain obscure (Cadle 1984, 1988). Genetic differentiation of the geographically isolated northern populations in British Columbia and Washington from those at the center of the species' distribution farther south is also unknown. Cook (1960), citing an unpublished report by W. Woodin (1951, manuscript on file at the MVZ, Univ. California, Berkeley), reported that *C. tenuis* from California, Oregon, and Washington were morphologically indistinguishable; very few specimens from Oregon and Washington, however, were available for comparisons. Knowledge of genetic variation among populations is important for conservation, and both molecular analyses and morphological comparisons are needed for *C. tenuis* from different parts of its geographic range.

Statements in the literature disagree whether or not pits are present in the dorsal scales of *C. tenuis*. Whereas Cope (1900) stated that pits are lacking, Wright and Wright (1957) stated that apical pits are present. Examinations of specimens from across the species' range conducted by both us and, at our request, by Greg Schneider (Museum of Zoology, University of Michigan) found no evidence of pits (unpubl. data; Greg Schneider, pers. comm.).

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